

Accuracy

This section provides estimates of the levels of uncertainty for insolation (solar radiation), temperature, surface pressure, relative humidity, and wind speed through comparisons with ground measurement data. It is generally considered that quality measured data are more accurate than satellite-derived values. However, measurement uncertainties from calibration drift, operational uncertainties, or data gaps are unknown for ground site data sets. In 1989, the World Climate Research Program estimated that most routine-operation ground sites had "end-to-end" uncertainties from 6 to 12%. Specialized high quality research sites are hopefully more accurate by a factor of two.

SSE estimates were compared with ground site data on a global basis. Radiation parameters were compared with data from the Baseline Surface Radiation Network (BSRN) (Table 1). Meteorological parameters were compared with data from the National Climate Data Center (NCDC) (Table 2). Wind speeds have been carried over from SSE Release 4 because newer data sets do not provide enough information about vegetation/surface types. The RETScreen Weather Database was used to test uncertainties in the SSE Release 4 wind speeds (Table 3).

Table 1: Regression analysis of SSE versus BSRN monthly averaged values for the time period July 1983 through June 2006

Parameter	Region	Bias (%)	RMS (%)
Horizontal Insolation	Global	-.01	10.25
	60° Poleward	-1.18	34.37
	60° Equatorward	0.29	8.71
Horizontal Diffuse Radiation	Global	7.49	29.34
	60° Poleward	11.29	54.14
	60° Equatorward	6.86	22.78
Direct Normal Radiation	Global	-4.06	22.73
	60° Poleward	-15.66	33.12
	60° Equatorward	2.40	20.93

Table 2: Linear least squares regression analysis of SSE versus NCDC monthly averaged values for the time period 1983 through 2006

Parameter	Slope	Intercept	R ²	RMSE	Bias
Tmax (°C)	0.99	-1.58	0.95	3.12	-1.83
Tmin (°C)	1.02	0.10	0.95	2.46	0.24
Tavg (°C)	1.02	-0.78	0.96	2.13	-0.58
Tdew (°C)	0.96	-0.80	0.95	2.46	-1.07
RH (%)	0.79	12.72	0.56	9.40	-1.92
Heating Degree Days (degree days)	1.02	12.47	0.93	77.20	17.28
Cooling Degree Days (degree days)	0.86	2.36	0.92	28.90	-5.65
Atmospheric Pressure (hPa)	0.89	102.16	0.74	27.33	-10.20

Table 3: Estimated uncertainty for monthly averaged wind speed for the time period July 1983 through June 1993

Parameter	Method	Bias	RMS
Wind Speed at 10 meters for terrain similar to airports (m/s)	RETScreen Weather Database (documented 10-m height airport sites)	-0.2	1.3
	RETScreen Weather Database (unknown-height airport sites)	-0.0	1.3

Review of the **Methodology Section** is recommended. It contains global maps and scatter charts comparing SSE methods both with each other and ground measurements. This information may help the user select a preferred method based on site location and the type of project.
